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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* YASUO MASUDA and TOSHIKI OKUI

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Appeal 2009-007652  
Application 10/568,126  
Technology Center 1700

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Before SALLY G. LANE, MICHAEL P. TIERNEY, and  
JEFFREY B. ROBERTSON, *Administrative Patent Judges*.

ROBERTSON, *Administrative Patent Judge*.

DECISION ON APPEAL<sup>1</sup>

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<sup>1</sup> The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the “MAIL DATE” shown on the PTOL-90A cover letter attached to this decision.

### STATEMENT OF THE CASE

Appellants seek our review under 35 U.S.C. § 134 of the Examiner's final decision rejecting claims 13-21. We have jurisdiction over the appeal under 35 U.S.C. § 6(b).

We AFFIRM.

### BACKGROUND

Appellants' invention is directed to a positive photoresist composition formed by dissolving an alkali soluble novolak resin where 3 to 7% of the phenolic hydroxyl group hydrogens are substituted by 1,2-naphthoquinone diazide sulfonyl groups in an organic solvent including 70-90% by weight of a propylene glycol alkyl ether acetate and ethyl lactate. (Spec. 8, ll. 21-25; 10, l. 18 – 11, l. 4.)

Claim 13 is illustrative:

13. A positive photoresist composition formed by dissolving (A) photosensitive novolak resin comprising an alkali soluble novolak resin wherein 3 to 7 mol% of hydrogen atoms within those of all phenolic hydroxyl groups of the alkali soluble novolak resin are substituted by 1,2-naphthoquinone diazide sulfonyl groups, wherein the alkali soluble novolak resin before substitution by 1,2-naphthoquinone diazide sulfonyl groups has been fractionated by weight to produce a degree of dispersion of 2.2 to 2.8, in (B) an organic solvent comprising 70 to 90% by weight of a propylene glycol alkyl ether acetate, and ethyl lactate.  
(Claims Appendix, App. Br. 14.)

Appellants appeal the following rejections:

1. Claims 13-21 under 35 U.S.C. § 103(a) as unpatentable over Bassett (U.S. 5,145,763, issued Sep. 8, 1992) in view of Mizuta (US 6,869,742 B2, issued Mar. 22, 2005), further in view of Lee (US 2003/0165770 A1, published Sep. 4, 2003), with Komano (U.S. 4,847,178, issued July 11,

- 1989), Nishio (U.S. 6,010,816, issued Jan. 4, 2000), and Misumi (US 2003/0059706 A1, published Mar. 27, 2003);
2. Claims 13-21 under 35 U.S.C. § 103(a) as unpatentable over Okazaki (U.S. 5,422,221, issued June 6, 1995) in view of Nishi (U.S. 5,759,736, issued June 2, 1998), Mizuta, further in view of Lee, with Komano, Nishio, and Misumi; and
  3. Claims 13-21 under 35 U.S.C. § 103(a) as unpatentable over Mizuta in view of Lee.

### APPELLANTS' CONTENTIONS

Appellants contend that they unexpectedly discovered a relationship between the slow development velocity of positive photoresist compositions including a photosensitive novolak resin formed from an alkali-soluble novolak, and the selection of solvent. (App. Br. 5.) Appellants argue that Lee, relied on by the Examiner in each of the rejections on appeal for disclosing the recited organic solvent combination, does not recognize the source of slow development. Appellants contend that Lee only teaches that the organic solvent does not react with the photosensitive compound and the novolak resin, and should have a sufficient dissolving power and an appropriate drying rate to form uniform and flat coating layers after evaporation of the solvent. (App. Br. 5.) Appellants also contend that Lee does not disclose novolak resins that have been substituted with 1,2-naphthoquinone diazide sulfonyl groups, but instead discloses naphthoquinone diazide that is separately used as a photosensitizer component, such that Lee does not recognize the beneficial effects of the recited photoresist composition. (App. Br. 6-7.) Additionally, Appellants

argue that Mizuta and Nishi do not disclose the solvent combination in the amounts recited in the claims. (App. Br. 6, 8.)

Appellants also point to alleged unexpected results for the claimed photoresist composition as evidence that the recited photoresist compositions would not have been obvious. (App. Br. 10-12.) Specifically, Appellants argue that the improvement obtained in both the development velocity and heat resistance when using propylene glycol methyl ether acetate (PGMEA) and ethyl lactate, exemplary of the recited solvent mixture, demonstrates unexpected results over photoresist compositions employing PGMEA as the only solvent. (App. Br. 11-12.) Appellants reiterate that Lee does not recognize such beneficial effects. (App. Br. 12.)

### ISSUES

(1) Would it have been obvious to one of ordinary skill in the art to employ propylene glycol methylether acetate and ethyl lactate in the percentages claimed in dissolving an alkali soluble novolak resin having 3 to 7 mol % of hydrogen atoms substituted by 1,2-naphthoquinone diazide sulfonyl groups and a degree of dispersion of 2.2 to 2.8 over Bassett, Okazaki, Nishi, and/or Mizuta in view of Lee?

(2) Did Appellants present sufficient evidence of unexpected results to outweigh the Examiner's evidence of obviousness?

### PRINCIPLES OF LAW

As stated by the Supreme Court in *KSR*, “any need or problem known in the field of endeavor at the time of [the] invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 420 (2007). It is not

necessary that the prior art suggest the combination for the same reason as contemplated by Appellants. *In re Kahn*, 441 F.3d 977, 987 (Fed. Cir. 2006). It is well settled that mere recognition of latent properties in the prior art does not render nonobvious an otherwise known invention. *In re Baxter Travenol Labs.*, 952 F.2d 388, 392 (Fed. Cir. 1991) (internal citations omitted).

A showing of unexpected results may be sufficient to overcome a *prima facie* case of obviousness. *In re Dillon*, 919 F.2d 688, 692-93 (Fed. Cir. 1990) (internal citations omitted). Such a showing must be based on evidence, not argument or speculation. *In re Mayne*, 104 F.3d 1339, 1343-44 (Fed. Cir. 1997); *In re Schulze*, 346 F.2d 600, 602 (CCPA 1965). The evidence must also be reasonably commensurate in scope with the claimed invention. *In re Greenfield*, 571 F.2d 1185, 1189 (CCPA 1978). “[W]hen unexpected results are used as evidence of nonobviousness, the results must be shown to be unexpected compared with the closest prior art.” *In re Baxter Travenol Labs.*, 952 F.2d 388, 392 (Fed. Cir. 1991).

## FACTUAL FINDINGS

We adopt the Examiner’s findings in the Answer and Final Office Action as our own, except as to those findings that we expressly overturn or set aside in the Analysis that follows. Additionally, the record supports the following findings of fact (FF) by a preponderance of the evidence.

1. Lee discloses a photoresist composition including an organic solvent that has “sufficient dissolving power and an appropriate drying rate to form [a] uniform and flat coating layer after evaporation thereof. The organic solvent is selected from the

group consisting of alkyl lactate-based solvent *which has a good dissolving power* . . . [and] acetate-based solvent *which has good layer-forming characteristic*, ether-based solvent, and their mixtures thereof.” (Para. [0041]) (emphasis added).

2. Lee discloses that “[m]ore preferably, PGMEA alone or a mixture of PGMEA and EL [ethyl lactate] in a ratio of about 9:1 to 7:3 by weight is used.” (Para. [0042].)
3. Appellants’ Specification presents results with a photosensitive novolak resin formed by replacing 4.5 mol % of hydrogen atoms of all phenolic hydroxyl groups with 1,2-naphthoquinonediazide-5-sulfonyl group in PGMEA alone (Example 1), a 70/30 mixture of PGMEA/ethyl lactate (Example 2), and ethyl lactate (Comparative Example 1. (Spec 25, l. 10 – 26, l. 10; Table 1.)
4. Appellants’ Specification discloses that developability was assessed by the number of rotation removal, where “[t]wo or less of the number was ranked as A; 3 of the number was ranked as B; 4 of the number was ranked as C; 5 or more of the number was ranked as D.” (Spec. 27, ll. 18-20.)
5. Appellants’ Specification discloses that heat resistance was evaluated by the angle between the substrate interface and a straight line connecting the point of intersection between the substrate interface and the side wall of the resist pattern, and the corner at the top of the resist pattern (“ $\theta$ ”), where “[p]atterns for which  $\theta > 80^\circ$  where recorded as ‘A’, patterns for which  $80^\circ \geq \theta$  and in which the corner still existed at the top of the resist pattern were recorded as ‘B.’” (Spec. 28, ll. 17-25; Figure 1.)

6. The photosensitive novolak resin in PGMEA alone (Example 1) had a developability of “A” and a Heat resistance of “B”; the 70/30 mixture of PGMEA/ethyl lactate (Example 2) had a developability of “B” and a Heat resistance of “A”; and ethyl lactate alone (Comparative Example 1) had a developability of “C” and a Heat resistance of “A.” (Table 1.)

### ANALYSIS

Although Appellants have argued each of the three grounds of rejection separately, Appellants rely on similar arguments for each ground of rejection. In addition, Appellants do not separately group the claims on appeal. Accordingly, we confine our discussion to appealed claim 1 with respect to Rejection 1, which contains claim limitations representative of the arguments made by Appellants, and address Rejections 2 and 3 only to the extent that Appellants have argued them separately pursuant to 37 C.F.R. § 41.37(c)(1)(vii).

#### *Issue 1*

Appellants do not dispute the Examiner’s findings that Bassett in view of Mizuta disclose a resist composition including a novolak resin where 3 to 7 % of the hydrogen atoms of the hydroxyl groups are replaced by a quinonediazido compound containing sulfonyl groups having the degree of dispersion as claimed. (Compare Ans. 3-4 with App. Br. 5-7.) Appellants also do not dispute that Lee discloses an organic solvent comprising 70 to 90% by weight of a propylene glycol alkyl ether acetate and ethyl lactate in forming a resist composition. *Id.*



We are, however, unpersuaded by Appellants' contention that Lee failed to recognize the problem of slow development. The reason for combining the solvent system described in Lee with Basset and Mizuta need not be the same as Appellants' reasons. *KSR*, 550 U.S. at 420; *Kahn*, 441 F.3d at 987. Moreover, latent properties, such as improvements in development and heat resistance to Appellants' recited solvent combination do not render the solvent combination nonobvious where the solvent combination was known as taught by Lee. *In re Baxter Travenol Labs.*, 952 F.2d at 392. Specifically, Lee discloses that the solvent should be selected to form a uniform and flat coating layer, and that use of an acetate-based solvent (such as PGMEA) has good layer-forming characteristics. (FF 1.) Lee also discloses the exact ratio of solvents recited in the claims. (FF 2.)

Appellants' arguments that Mizuta does not disclose the recited solvent combination are also not persuasive as the Examiner does not rely on Mizuta for that purpose. In addition, regarding Rejection 2, we are unconvinced that because Nishi discloses a working example with a combination of PGMEA and ethyl lactate in amounts outside the ranges recited in the claims, one of ordinary skill in the art would not have arrived at the recited solvent combination. (App. Br. 8.) The Examiner does not rely on Nishi for the amounts of solvents in the claims. (Ans. 6.) Rather, the Examiner again relies on Lee for the amounts of solvents. (Ans. 6-7.) In addition, Nishi does not provide any general guidance in selecting the amount of solvents in the solvent mixture such that one skilled in the art would have been discouraged from using the claimed amount. In light of the guidance provided by Lee in choosing solvents and amounts discussed above, we agree with the Examiner that the recited combination of solvent in

the recited amounts would have been obvious to one of ordinary skill in the art.

*Issue 2*

We agree with the Examiner that Appellants have not presented sufficient evidence to establish that the development and heat resistance properties of the recited solvent combination would have been unexpected. (Ans. 10-11.) Though the results provided by Appellants show differences in developability and heat resistance between PGMEA alone, a 70/30 combination of PGMEA/ethyl lactate, and ethyl lactate alone (FF 3, 6), Appellants have provided insufficient evidence, and rely only on Attorney argument for the position that such results would have been unexpected. Indeed, in view of the slight differences that may give rise to the different ratings used in evaluating the results, there is insufficient evidence that the 70/30 combination of PGMEA/ethyl lactate, versus PGMEA alone would have been unexpected, particularly in view of the inferior developability and greater heat resistance obtained with ethyl lactate alone. (FF 4-6.) Therefore, Appellant's evidence of unexpected results does not outweigh the Examiner's evidence of obviousness.

DECISION

We affirm the Examiner's § 103 rejections of claims 13-21.

TIME PERIOD

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1) (2009).

Appeal 2009-007652  
Application 10/568,126

ORDER  
AFFIRMED

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